Department of Energy
Germantown, MD 20874

Paper for Discussions: Development of Innovative Confinement Concepts (ICC)

One of the major FEAC recommendations made in its report "A Restructured Fusion Energy Program" was "The restructured program will focus on continued development of fusion science with increasing attention to concept innovation and alternate approaches to fusion." Another important FEAC recommendation was that OFES must "rely significantly on peer review as the primary input for funding allocations." This letter outlines a plan to implement these recommendations in the area of concept innovation and alternate approaches. We will henceforth refer to this area as innovative confinement concepts (ICC) to include the possibility of innovation within the tokamak concept as well.

Background

At a meeting in the fall of 1996 in Leesburg, VA, a group of fusion program participants recommended, as a first concrete step in restarting ICC research, that a meeting be organized by PPPL where U.S. scientists interested in ICC could gather together and exchange ideas. This ICC Workshop which was organized by Rob Goldston of PPPL along with the help of a broadly based program committee, was held in Los Angeles in February 1997, with the assistance of UCLA. The workshop brought together for the first time in seven years a majority of the scientists in the U.S. interested in ICC development and was judged by the participants to be a great success.

Subsequently, the OFES published Notice 97-08 seeking experimental and study proposals on "Innovations in Fusion Energy Confinement Systems" offering $3,000,000 of new FY 1998 funding in this area (annually renewed for up to three years). Forty proposals were received, many of which we believe were greatly strengthened by the proposers' participation in the ICC Workshop. Four new programs (of which two are multi-institutional) have now been selected for funding.

Community Role

In considering how to continue to best develop ICC in the restructured fusion energy sciences program we would like to build on these successes. We are therefore proposing a continuation of the ICC Workshop on a yearly

basis as the best way to encourage development of ICC ideas. I am asking PPPL, by copy of this letter, to continue to take the lead in organizing this yearly ICC Workshop, which would be held in the late winter at various community sites. As with the first ICC Workshop, these workshops should be scientific in nature. In this vein, we expect that no recommendations about specific concepts will be made by the organizing committee as an outcome of the Workshop.

Apart from the ICC Workshop process we would, however, encourage the various ICC communities to prepare white papers, which both summarize the scientific state of their concept and contain the community's vision of the optimum development path for the concept. These papers could be distributed to colleagues and discussed at the ICC Workshop for feedback. These white papers will also be useful to us in understanding the research priorities within the various ICC concepts and in communicating with our sponsors about the status of various ICC concepts.

OFES Role

At the exploratory level of development, we envision that the periodic publication of Notices soliciting proposals will be the main means of selecting new experimental activities. It is anticipated that each ongoing experimental program would participate in such a Notice at an appropriate time within six years after inception. We expect to follow closely the recommendations of the broadly based panels that will be assembled to peer review the proposals received. The need to resolve scientific issues as developed in the white papers will play an important role in the selection of new programs because the review criteria of greatest importance under DOE selection rules is the scientific merit of the proposal. Theory support, special diagnostic development for concepts being studied experimentally and systems studies will follow and will be an important part of each of the concept's development program. The goal of the exploratory scale ICC programs will be to achieve the highest level of scientific inquiry possible within the funding limitations.

When a concept reaches the stage where the proponents believe their concept is ready to undertake a proof of principle level program, we expect that we will receive a community-based proposal for the total proof of principle program which will specifically cover not only the proof of principle experiment itself, but also what is needed in terms of theory

support and the requirements, if any, for smaller supporting experiments and the development of enabling technologies. We expect to transmit these proposals to our Fusion Energy Sciences Advisory Committee for review and recommendation. We believe that the processes described here implement the spirit of the FEAC recommendations on the development of ICC concepts.